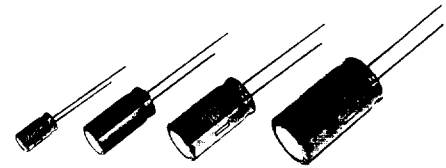


# NHE Series



## Features

- Compact size (Same case size as SU series) and long life (1000 ~ 2000 hours at +105°C)
- Wide CV value range (0.1 ~ 15000μF/6.3 ~ 450V)

## Specifications

Item	Performance Characteristics										
Rated Working Voltage Range	6.3 to 100V DC	160 to 450V DC									
Operating Temperature Range	-55 to +105°C	-25 to +105°C									
Nominal Capacitance Range	0.1 to 15000μF	0.47 to 220μF									
Capacitance Tolerance	±20% (120Hz, +20°C)										
Leakage Current	$I \leq 0.01CV$ or 3 [μA] whichever is greater	$I \leq 0.06CV + 10$ [μA]									
	after 2 minutes application of rated working voltage at +20°C										
tan δ	Working voltage [V]	6.3	10	16	25	35	50	63	100		
	tan δ max.	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.07		
	Working voltage [V]	160	200	250	350	400	450				
	tan δ max.	0.15	0.15	0.15	0.20	0.24	0.24				
	(120Hz, +20°C)	For capacitance value >1000μF, add 0.02 per another 1000μF									
Maximum Permissible Ripple Current	Refer to standard products table (120Hz, +105°C) Correction factor for frequency										
		Freq. [Hz]		60	120	1k	10k	100k			
	W.V. [V.DC]	Cap. [μF]									
	6.3 ~ 50	0.1 ~ 330		0.85	1	1.30	1.40	1.55			
		470 ~ 3300		0.95	1	1.15	1.20	1.25			
		≥ 4700		0.95	1	1.10	1.20	1.20			
	63 ~ 100	0.47 ~ 33		0.75	1	1.55	1.65	1.80			
		47 ~ 220		0.75	1	1.40	1.60	1.65			
		≥ 330		0.80	1	1.30	1.35	1.40			
	≥ 160	1 ~ 220		0.70	1	1.30	1.70	1.70			
Low Temperature Characteristics	Impedance ratio max. at 120Hz.										
	Working voltage [V]	6.3	10	16	25	35	50	63	100		
	-25°C/+20°C	4	3	2	2	2	2	2	2		
	-40°C/+20°C	8	6	4	3	3	3	3	3		
	-55°C/+20°C	12	10	8	6	6	6	6	6		
	Working voltage [V]	160	200	250	350	400	450				
	-25°C/+20°C	3	3	3	6	6	15				
For capacitance value >1000μF: Add 0.5 per another 1000μF for -25°C/+20°C. Add 1.0 per another 1000μF for -40°C/+20°C. Add 2.0 per another 1000μF for -55°C/+20°C.											

### SPECIFICATIONS

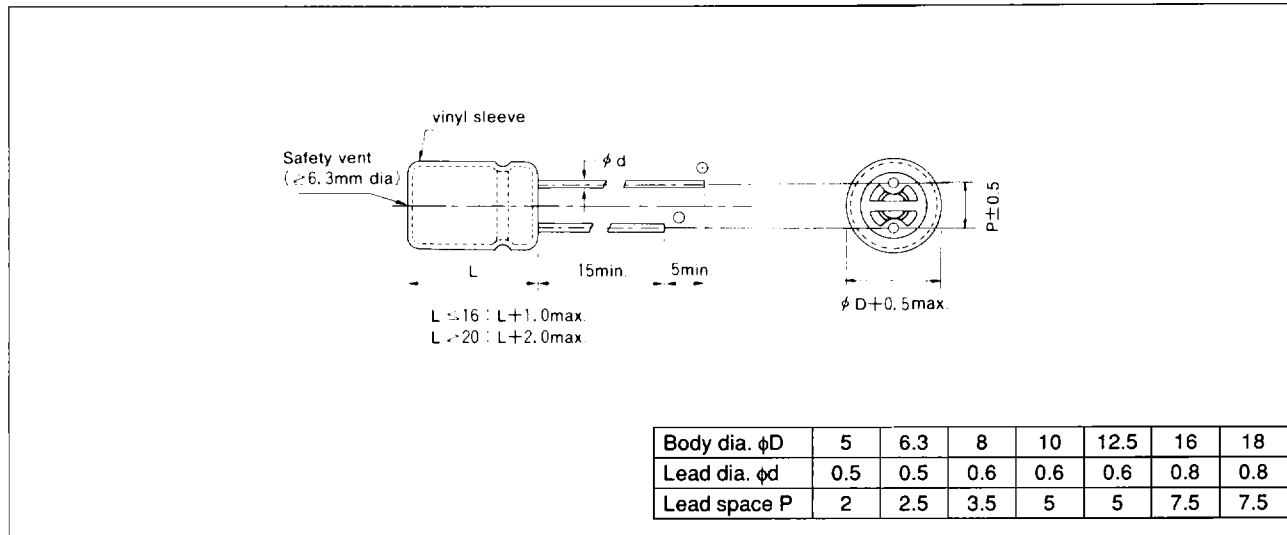
Item	Performance Characteristics															
High Temperature Loading	<p>Test conditions</p> <p>Duration : 2000 hours (1000 hours for <math>\leq \phi 8</math> mm. products)</p> <p>Ambient temperature : +105°C</p> <p>Applied voltage : DC voltage with maximum permissible ripple current specified at +105°C (Sum of the DC voltage and super-imposed peak AC voltage for maximum permissible ripple current should be equal to rated DC working voltage.)</p> <p>Post test requirements at +20°C</p> <p>Leakage current : <math>\leq</math> Initial specified value</p> <p>Capacitance change : <math>\leq \pm 20\%</math> of initial measured value</p> <p>tan <math>\delta</math> : <math>\leq 200\%</math> of initial specified value</p>															
Shelf Life	<p>Test conditions</p> <p>Duration : 1000 hours</p> <p>Ambient temperature : +105°C</p> <p>Applied voltage : (None)</p> <p>Post test requirements at +20°C</p> <p>Same limits for high temperature loading.</p>															
Cleaning	<p>Capacitors for ratings of 6.3V to 100V shall be capable of withstanding exposure to following cleaning solvents.</p> <table border="1"> <thead> <tr> <th>Conditions</th> <th>Solvent condition</th> <th>Exposure time</th> <th>Temperature</th> <th>Ultrasonic wave</th> </tr> </thead> <tbody> <tr> <td>Solvents</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Freon-TE, TES, TP35 or equivalents</td> <td>Liquid or vapor</td> <td><math>\leq 5</math> min (total)</td> <td><math>\leq</math> boiling point at 1 atm</td> <td>Acceptable</td> </tr> </tbody> </table>	Conditions	Solvent condition	Exposure time	Temperature	Ultrasonic wave	Solvents					Freon-TE, TES, TP35 or equivalents	Liquid or vapor	$\leq 5$ min (total)	$\leq$ boiling point at 1 atm	Acceptable
Conditions	Solvent condition	Exposure time	Temperature	Ultrasonic wave												
Solvents																
Freon-TE, TES, TP35 or equivalents	Liquid or vapor	$\leq 5$ min (total)	$\leq$ boiling point at 1 atm	Acceptable												

### Part Number System



### Dimensions

[mm]



**Case Size Table**

φD × L [mm]

W.V.[V.DC] Cap.[μF]	6.3 (0J)	10 (1A)	16 (1C)	25 (1E)	35 (1V)	50 (1H)	63 (1J)	100 (2A)
0.1 (0R1)						5 × 11		
0.22 (R22)						5 × 11		
0.33 (R33)						5 × 11		
0.47 (R47)						5 × 11		5 × 11
1 (010)						5 × 11		5 × 11
2.2 (2R2)						5 × 11		5 × 11
3.3 (3R3)						5 × 11		5 × 11
4.7 (4R7)						5 × 11		5 × 11
10 (100)						5 × 11	5 × 11	6.3 × 11.2
22 (220)						5 × 11	6.3 × 11.2	8 × 11.5
33 (330)					5 × 11	6.3 × 11.2	6.3 × 11.2	10 × 12.5
47 (470)			5 × 11	5 × 11	6.3 × 11.2	6.3 × 11.2	8 × 11.5	10 × 16
100 (101)	5 × 11	5 × 11	6.3 × 11.2	6.3 × 11.2	8 × 11.5	8 × 12.5	10 × 12.5	12.5 × 20
220 (221)	6.3 × 11.2	6.3 × 11.2	8 × 11.5	8 × 12.5	10 × 12.5	10 × 16	10 × 20	16 × 25
330 (331)	6.3 × 11.2	8 × 11.5	8 × 12.5	10 × 12.5	10 × 16	10 × 20	12.5 × 20	16 × 25
470 (471)	8 × 12.5	8 × 12.5	10 × 12.5	10 × 16	10 × 20	12.5 × 20	12.5 × 25	16 × 31.5
1000 (102)	10 × 12.5	10 × 16	10 × 20	12.5 × 20	12.5 × 25	16 × 25	16 × 31.5	
2200 (222)	12.5 × 20	12.5 × 20	12.5 × 25	16 × 25	16 × 31.5	18 × 35.5		
3300 (332)	12.5 × 20	12.5 × 25	16 × 25	16 × 31.5	18 × 35.5			
4700 (472)	16 × 25	16 × 25	16 × 31.5	18 × 35.5				
6800 (682)	16 × 25	16 × 31.5	18 × 35.5					
10000 (103)	16 × 31.5	18 × 35.5						
15000 (153)	18 × 35.5							

W.V.[V.DC] Cap.[μF]	160 (2C)	200 (2D)	250 (2E)	350 (2V)	400 (2G)	450 (2W)
0.47 (R47)	6.3 × 11.2	6.3 × 11.2	6.3 × 11.2	8 × 11.5	8 × 11.5	
1 (010)	6.3 × 11.2	6.3 × 11.2	6.3 × 11.2	10 × 12.5	10 × 12.5	10 × 16
2.2 (2R2)	6.3 × 11.2	6.3 × 11.2	8 × 11.5	10 × 16	10 × 16	10 × 20
3.3 (3R3)	8 × 11.5	8 × 11.5	10 × 12.5	10 × 16	10 × 20	12.5 × 20
4.7 (4R7)	8 × 11.5	10 × 12.5	10 × 12.5	10 × 20	10 × 20	12.5 × 20
10 (100)	10 × 12.5	10 × 16	10 × 20	12.5 × 20	12.5 × 25	16 × 25
22 (220)	10 × 20	10 × 20	12.5 × 25	16 × 25 <sup>Z</sup>	16 × 25	16 × 31.5
33 (330)	12.5 × 20	12.5 × 25	12.5 × 25	16 × 25	16 × 31.5	18 × 31.5 <sup>W</sup>
47 (470)	12.5 × 25	12.5 × 25	16 × 25	16 × 31.5 <sup>W</sup>	18 × 31.5	
100 (101)	16 × 25	16 × 31.5	18 × 31.5 <sup>W</sup>			
220 (221)	18 × 31.5 <sup>W</sup>					

( ) shows W.V. and capacitance code.

\* W and Z of case size table shows the last suffix code of part number.

**Standard Products Table**

W.V. [V.DC]	Cap. [ $\mu$ F]	Part No.	Cap. tol. [%] (120Hz/+20°C)	D.C.L. (+20°C/2 min.) [ $\mu$ A] max.	tan $\delta$ (120Hz/+20°C) max.	Ripple current (120Hz/+105°C) [mA] rms max.	Dimensions [mm]	
							$\phi$ D	L
6.3	100	ECEA0JGE101	$\pm 20$	6.3	0.22	91	5	11
	220	ECEA0JGE221		13.8	0.22	150	6.3	11.2
	330	ECEA0JGE331		20.7	0.22	230	6.3	11.2
	470	ECEA0JGE471		29.6	0.22	250	8	12.5
	1,000	ECEA0JGE102		63.0	0.22	450	10	12.5
	2,200	ECEA0JGE222		138.6	0.24	780	12.5	20
	3,300	ECEA0JGE332		207.9	0.26	920	12.5	20
	4,700	ECEA0JGE472		296.1	0.28	1150	16	25
	6,800	ECEA0JGE682		428.4	0.32	1440	16	25
	10,000	ECEA0JGE103		630.0	0.40	1700	16	31.5
	15,000	ECEA0JGE153		945.0	0.50	1910	18	35.5
10	100	ECEA1AGE101	$\pm 20$	10.0	0.19	110	5	11
	220	ECEA1AGE221		22.0	0.19	160	6.3	11.2
	330	ECEA1AGE331		33.0	0.19	230	8	11.5
	470	ECEA1AGE471		47.0	0.19	270	8	12.5
	1,000	ECEA1AGE102		100.0	0.19	500	10	16
	2,200	ECEA1AGE222		220.0	0.21	850	12.5	20
	3,300	ECEA1AGE332		330.0	0.23	1080	12.5	25
	4,700	ECEA1AGE472		470.0	0.25	1270	16	25
	6,800	ECEA1AGE682		680.0	0.29	1530	16	31.5
	10,000	ECEA1AGE103		1000.0	0.37	1870	18	35.5
	16	47		ECEA1CGE470	$\pm 20$	7.5	0.16	77
100		ECEA1CGE101	16.0	0.16		120	6.3	11.2
220		ECEA1CGE221	35.2	0.16		210	8	11.5
330		ECEA1CGE331	52.8	0.16		260	8	12.5
470		ECEA1CGE471	75.2	0.16		330	10	12.5
1,000		ECEA1CGE102	160.0	0.16		600	10	20
2,200		ECEA1CGE222	352.0	0.18		1010	12.5	25
3,300		ECEA1CGE332	528.0	0.20		1210	16	25
4,700		ECEA1CGE472	752.0	0.22		1490	16	31.5
6,800		ECEA1CGE682	1088.0	0.26		1740	18	35.5
25	47	ECEA1EGE470	$\pm 20$	11.7	0.14	91	5	11
	100	ECEA1EGE101		25.0	0.14	130	6.3	11.2
	220	ECEA1EGE221		55.0	0.14	220	8	12.5
	330	ECEA1EGE331		82.5	0.14	300	10	12.5
	470	ECEA1EGE471		117.5	0.14	410	10	16
	1,000	ECEA1EGE102		250.0	0.14	720	12.5	20
	2,200	ECEA1EGE222		550.0	0.16	1110	16	25
	3,300	ECEA1EGE332		825.0	0.18	1380	16	31.5
	4,700	ECEA1EGE472		1175.0	0.20	1690	18	35.5
	35	33		ECEA1VGE330	$\pm 20$	11.5	0.12	84
47		ECEA1VGE470	16.4	0.12		98	6.3	11.2
100		ECEA1VGE101	35.0	0.12		160	8	11.5
220		ECEA1VGE221	77.0	0.12		260	10	12.5
330		ECEA1VGE331	115.5	0.12		360	10	16
470		ECEA1VGE471	164.5	0.12		480	10	20

**Standard Products Table**

W.V. [V.DC]	Cap. [μF]	Part No.	Cap. tol. [%] (120Hz/+20°C)	D.C.L. (+20°C/2 min.) [μA] max.	tan δ (120Hz/+20°C) max.	Ripple current (120Hz/+105°C) [mA] rms max.	Dimensions [mm]	
							φD	L
35	1,000	ECEA1VGE102	±20	350.0	0.12	840	12.5	25
	2,200	ECEA1VGE222		770.0	0.14	1270	16	31.5
	3,300	ECEA1VGE332		1155.0	0.16	1540	18	35.5
50	0.1	ECEA1HGER0R1	±20	3.0	0.10	1.1	5	11
	0.22	ECEA1HGER22		3.0	0.10	2.3	5	11
	0.33	ECEA1HGER33		3.0	0.10	3.5	5	11
	0.47	ECEA1HGER47		3.0	0.10	5	5	11
	1	ECEA1HGE010		3.0	0.10	10	5	11
	2.2	ECEA1HGE2R2		3.0	0.10	18	5	11
	3.3	ECEA1HGE3R3		3.0	0.10	22	5	11
	4.7	ECEA1HGE4R7		3.0	0.10	26	5	11
	10	ECEA1HGE100		5.0	0.10	39	5	11
	22	ECEA1HGE220		11.0	0.10	70	5	11
	33	ECEA1HGE330		16.5	0.10	91	6.3	11.2
	47	ECEA1HGE470		23.5	0.10	100	6.3	11.2
	100	ECEA1HGE101		50.0	0.10	170	8	12.5
	220	ECEA1HGE221		110.0	0.10	330	10	16
	330	ECEA1HGE331		165.0	0.10	440	10	20
470	ECEA1HGE471	235.0	0.10	580	12.5	20		
1,000	ECEA1HGE102	500.0	0.10	940	16	25		
2,200	ECEA1HGE222	1100.0	0.12	1490	18	35.5		
63	10	ECEA1JGE100	±20	6.3	0.09	51	5	11
	22	ECEA1JGE220		13.8	0.09	84	6.3	11.2
	33	ECEA1JGE330		20.7	0.09	98	6.3	11.2
	47	ECEA1JGE470		29.6	0.09	130	8	11.5
	100	ECEA1JGE101		63.0	0.09	210	10	12.5
	220	ECEA1JGE221		138.6	0.09	400	10	20
	330	ECEA1JGE331		207.9	0.09	550	12.5	20
	470	ECEA1JGE471		296.1	0.09	700	12.5	25
	1,000	ECEA1JGE102		630.0	0.09	1130	16	31.5
100	0.47	ECEA2AGER47	±20	3.0	0.07	9	5	11
	1	ECEA2AGE010		3.0	0.07	14	5	11
	2.2	ECEA2AGE2R2		3.0	0.07	21	5	11
	3.3	ECEA2AGE3R3		3.3	0.07	31	5	11
	4.7	ECEA2AGE4R7		4.7	0.07	38	5	11
	10	ECEA2AGE100		10.0	0.07	61	6.3	11.2
	22	ECEA2AGE220		22.0	0.07	98	8	11.2
	33	ECEA2AGE330		33.0	0.07	130	10	12.5
	47	ECEA2AGE470		47.0	0.07	160	10	16
	100	ECEA2AGE101		100.0	0.07	280	12.5	20
	220	ECEA2AGE221		200.0	0.07	510	16	25
	330	ECEA2AGE331		330.0	0.07	650	16	25
470	ECEA2AGE471	470.0	0.07	880	16	31.5		
160	0.47	ECEA2CGER47	±20	14.5	0.15	12	6.3	11.2
	1	ECEA2CGE010		19.6	0.15	17	6.3	11.2
	2.2	ECEA2CGE2R2		31.1	0.15	25	6.3	11.2

**Standard Products Table**

W.V. [V.DC]	Cap. [μF]	Part No.	Cap. tol. [%] (120Hz/+20°C)	D.C.L. (+20°C/2 min.) [μA] max.	tan δ (120Hz/+20°C) max.	Ripple current (120Hz/+105°C) [mA] rms max.	Dimensions [mm]	
							φD	L
160	3.3	ECEA2CGE3R3	±20	41.6	0.15	36	8	11.5
	4.7	ECEA2CGE4R7		55.1	0.15	43	8	11.5
	10	ECEA2CGE100		106.0	0.15	70	10	12.5
	22	ECEA2CGE220		221.2	0.15	130	10	20
	33	ECEA2CGE330		326.8	0.15	180	12.5	20
	47	ECEA2CGE470		461.2	0.15	220	12.5	25
	100	ECEA2CGE101		970.0	0.15	330	16	25
	220	ECEA2CGE221W		2122.0	0.15	500	18	31.5
200	0.47	ECEA2DGER47	±20	15.7	0.15	12	6.3	11.2
	1	ECEA2DGE010		22.0	0.15	17	6.3	11.2
	2.2	ECEA2DGE2R2		36.4	0.15	25	6.3	11.2
	3.3	ECEA2DGE3R3		49.6	0.15	36	8	11.5
	4.7	ECEA2DGE4R7		66.4	0.15	50	10	12.5
	10	ECEA2DGE100		130.0	0.15	80	10	16
	22	ECEA2DGE220		274.0	0.15	140	10	20
	33	ECEA2DGE330		406.0	0.15	190	12.5	25
	47	ECEA2DGE470		574.0	0.15	220	12.5	25
	100	ECEA2DGE101		1210.0	0.15	335	16	31.5
250	0.47	ECEA2EGER47	±20	17.0	0.15	12	6.3	11.2
	1	ECEA2EGE010		25.0	0.15	17	6.3	11.2
	2.2	ECEA2EGE2R2		43.0	0.15	29	8	11.5
	3.3	ECEA2EGE3R3		59.5	0.15	42	10	12.5
	4.7	ECEA2EGE4R7		80.5	0.15	50	10	12.5
	10	ECEA2EGE100		160.0	0.15	88	10	20
	22	ECEA2EGE220		340.0	0.15	155	12.5	25
	33	ECEA2EGE330		505.0	0.15	190	12.5	25
	47	ECEA2EGE470		715.0	0.15	230	16	25
	100	ECEA2EGE101W		1510.0	0.15	340	18	31.5
350	0.47	ECEA2VGER47	±20	19.8	0.20	11	8	11.5
	1	ECEA2VGE010		31.0	0.20	18	10	12.5
	2.2	ECEA2VGE2R2		56.2	0.20	31	10	16
	3.3	ECEA2VGE3R3		79.3	0.20	38	10	16
	4.7	ECEA2VGE4R7		108.7	0.20	49	10	20
	10	ECEA2VGE100		220.0	0.20	82	12.5	20
	22	ECEA2VGE220Z		472.0	0.20	130	16	25
	33	ECEA2VGE330		703.0	0.20	175	16	25
	47	ECEA2VGE470W		997.0	0.20	230	16	31.5
400	0.47	ECEA2GGER47	±20	21.2	0.24	11	8	11.5
	1	ECEA2GGE010		34.0	0.24	18	10	12.5
	2.2	ECEA2GGE2R2		62.8	0.24	30	10	16
	3.3	ECEA2GGE3R3		89.2	0.24	40	10	20
	4.7	ECEA2GGE4R7		122.8	0.24	45	10	20
	10	ECEA2GGE100		250.0	0.24	79	12.5	25
	22	ECEA2GGE220		538.0	0.24	145	16	25
	33	ECEA2GGE330		802.0	0.24	185	16	31.5
	47	ECEA2GGE470		1138.0	0.24	230	18	31.5

**Standard Products Table**

W.V. [V.DC]	Cap. [ $\mu$ F]	Part No.	Cap. tol. [%] (120Hz/+20°C)	D.C.L. (+20°C/2 min.) [ $\mu$ A] max.	tan $\delta$ (120Hz/+20°C) max.	Ripple current (120Hz/+105°C) [mA] rms max.	Dimensions [mm]	
							$\phi$ D	L
450	1	ECEA2WGE010	$\pm 20$	38.0	0.24	18	10	16
	2.2	ECEA2WGE2R2		69.4	0.24	29	10	20
	3.3	ECEA2WGE3R3		99.1	0.24	41	12.5	20
	4.7	ECEA2WGE4R7		136.9	0.24	49	12.5	20
	10	ECEA2WGE100		280.0	0.24	75	16	25
	22	ECEA2WGE220		604.0	0.24	115	16	31.5
	33	ECEA2WGE330W		901.0	0.24	145	18	31.5